2 COMMON ISSUES

Several topics were considered by DOE to need further explanation or clarification. These topics, called common issues, relate to comments received on the draft SA or are topics not related to the environmental review but are considered by DOE to be of broad interest or concern to stakeholders. The common issues include the following topics:

- Supplement Analysis Process
- Proposed Changes in Administrative Limits
- Opposition to Nuclear Activities
- Concerns With HEPA filters

2.1 SUPPLEMENT ANALYSIS PROCESS

DOE issued the Final Environmental Impact Statement and Environmental Impact Report (EIS/EIR) for Continued Operation of Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore in 1992, to meet the requirements of the National Environmental Policy Act and the California Environmental Quality Act. The 1992 EIS/EIR evaluated the impacts on the environment of existing and proposed operations at LLNL and SNL-L for the period 1992 through 2002. On January 21, 1993, DOE issued a ROD to continue operation of LLNL and SNL-L, including projects proposed for the near term (next 5 to 10 years). The preferred alternative included current operations, programmatic enhancements, and facility modifications in support of research and development missions established by the President and Congress.

DOE prepares site-wide EISs for certain large, multiple-facility DOE sites to assess the environmental impacts of operations at these sites. DOE's regulations require the evaluation of site-wide EISs at least every five years by means of a supplement analysis to determine whether the existing EIS remains adequate, whether to prepare a new site-wide EIS, or supplement the existing EIS. DOE issued *the Draft Supplement Analysis for the Lawrence Livermore National Laboratory and Sandia National Laboratories, Livermore Site-wide Environmental Impact Statement* for public review and comment on January 26, 1999.

The Council on Environmental Quality regulations for implementing NEPA state that a supplemental EIS "shall be prepared if there are substantial changes to the proposal or significant new circumstances or information relevant to environmental concerns." In preparing this SA, DOE examined the current project and program plans and proposals for LLNL and SNL-L to identify new or modified projects or operations or new information for the period from now to 2002 that was not available for consideration in the 1992 EIS/EIR. When such elements were found, they were examined to determine if they resulted in environmental impacts that exceeded the bounds of the impacts of LLNL and SNL-L operations presented in the 1992 EIS/EIR analysis; and if the bounds were exceeded, whether the incremental environmental impacts were significant. A *bounding analysis* is an analysis designed to overestimate or determine an upper limit to potential impacts or risks.

The SA determined that SNL-L continues to operate within the levels described in 1992. No significant new programs or projects have been proposed since 1992 or are planned for SNL-L for the near future. The SNL-L evaluation revealed that the impacts were within the bounds of the 1992 EIS/EIR analysis or the incremental differences in impacts were not significant. No supplementation of the 1992 EIS/EIR is needed on the basis of SNL-L activities.

LLNL continues to operate within the general statement of action described in 1992 EIS/EIR and its associated ROD; however, some projects and proposals have been cancelled or modified and some new ones have been developed. In addition, some new information is available on the site environment. A number of key projects or proposals were identified that would be implemented between 1998 and 2002. Also identified were proposed changes in administrative limits for certain radioactive materials and changes in waste generation and management. Administrative limits are the total quantities of certain materials allowed in LLNL facilities.

When environmental impact areas were screened to determine whether it was clear that impacts of LLNL operations, considering this new information, would remain within the envelope of environmental consequences analyzed in the 1992 EIS/EIR, DOE found that further evaluation was required for seven impact areas. These areas included sensitive species, wetlands, paleontological resources, radiological consequences of accidents, waste generation and management, environmental justice, and cumulative impacts. The SA presents the results of these evaluations, and concludes that either the projected impacts are within the bounds of the 1992 EIS/EIR analysis, or that the incremental differences are not significant. The overall picture of site-wide LLNL operations remains very similar to that presented in the 1992 EIS/EIR, and supplementation is not needed.

2.2 PROPOSED CHANGES IN ADMINISTRATIVE LIMITS

In response to its research and development mission and programmatic needs to the year 2002, DOE is proposing changes in administrative limits for certain radioactive materials in some of the LLNL buildings that carry out these activities.

Administrative limits are controls on the maximum amounts of material that can be processed at one time or kept in storage. As the name implies, these limits are administrative rather than regulatory. Administrative limits are set only at the level that is needed to meet programmatic activities and take into account safety and material accountability restrictions. Administrative limits may be established for a group of buildings, a single building or room, a storage vault, a glovebox, or even a container. DOE analyzes the associated environmental impacts of the administrative limits in NEPA documents for nuclear and hazardous facilities. Administrative limits for plutonium, uranium, and tritium are within the capacity and infrastructure capabilities analyzed by the safety analysis report (SAR) process. The enhanced programs that require higher material inventories are listed in the SA. The safety implications of proposed changes to the administrative limits that were analyzed in the 1992 EIS/EIR and its ROD are reviewed in this SA.

DOE is proposing to change the administrative limit for uranium in Buildings 332 and 334 from 300 kilograms to 3500 kilograms. This would consist of 500 kilograms of enriched uranium (greater than 1% in the U-235 isotope), and 3,000 kilograms of depleted or natural uranium (less than 1% in U-235). The isotope U-235 is capable of fission, that is, when collocated in sufficient quantity (called a critical mass), it can be the source of criticality accidents, and can serve as a fuel in reactors and nuclear weapons. The 3,000 kilograms of uranium with less than 1% U-235, while radioactive at a low level and toxic to humans, is not capable of a sustained nuclear reaction under current facility conditions. This latter form is the uranium found naturally in soils and rocks throughout much of the world.

Although the proposed administrative limits for uranium would increase the total amount in the building complex, controls would continue to limit the material in a glovebox or at a work station well below that of a critical mass. In other words, the amount of material in storage would increase, but the amount of material being worked on at any one time would not increase. Nevertheless, a criticality accident of low probability is possible with uranium. The 1992 EIS/EIR identified as possible an inadvertent plutonium criticality accident for Building 332 with a dose of 2.0 rem at the LLNL fenceline as the bounding criticality accident for the Building. Subsequent analysis in the 1995 SAR indicated a uranium criticality accident could result in a dose of 3.8 rem at the fenceline. To put this in perspective, this dose is within the range (1 to 5 rem) at which some protective action is recommended by the U.S. Environmental Protection Agency (EPA), and is not unlike the 2.0 rem dose from a plutonium criticality accident in the 1992 EIS/EIR. The offsite population dose is still conservatively estimated to result in less than one fatal cancer among the public, as discussed in both the SA and in the 1992 EIS/EIR.

DOE is proposing to raise the administrative limit for tritium in Building 331 to 30 grams. The increase is necessary to enable LLNL to support programs associated with decommissioning and decontamination of DOE’s Mound site, the expansion of the U.S. Army Tritium Recovery and Recycle Project, and the target fills for the National Ignition Facility (NIF). Before 1992, the tritium limit for Building 331 was 300 grams. The 1992 EIS/EIR set an administrative limit of 5 grams of tritium in any one facility, with no more than 10 grams to be divided among Buildings 298, 391 and 331. While the current proposal is to increase the administrative limit to 30 grams, the total quantity of tritium material that would ever be at risk during operations would remain the same as analyzed in the 1992 EIS/EIR. The administrative control enforced in 1992 has not changed and still limits the inventory stored in any one vessel or connecting process (the “at risk” inventory) to 3.5 grams. Accidents with potential for releasing the additional tritium from its stored configuration are not considered credible. Major improvements in facility systems and operations since 1992 have significantly reduced the expected frequency of accidents leading to tritium release. While tritium facility activities are expected to increase if the proposed 30 grams inventory limit is approved, they would not approach the level upon which the 1992 EIS/EIR analysis was based.

DOE proposes to raise the limits for Building 239 from 4.5 to 6 kilograms for plutonium and from 18.5 to 25 kilograms for uranium, as discussed in section 6.2.3 of the SA. Components are brought into Building 239 for radiographic inspection; all of the plutonium and uranium in the components is sealed in doubly contained packaging that is not removed during radiographic operations, and the sealed containers are returned to storage in Building 332.

The current Building 239 SAR evaluates the consequences of a seismic event or accidental dropping of a component, compromising the containment barriers, based on an inventory of 4.5 kilograms of plutonium or 18.5 kilograms of uranium. The SAR analysis was scaled linearly to provide an estimate of the doses that would result from an accident with the proposed larger amounts of radioactive material. These projected doses are much lower than the whole-body dose range at which the EPA recommends protective action for accident releases and are well within the 1992 EIS/EIR bounding accidents involving operations with plutonium or uranium at LLNL.

The SA demonstrates that while the calculated consequences to the exposed populations and to a maximally exposed individual from an accident would increase in some cases over those published in the 1992 EIS/EIR, these impacts still are not significantly different from those established by the 1992 EIS/EIR. The accident analysis presented in the 1992 EIS/EIR still adequately characterizes the potential impacts of such accidents that may occur at LLNL, even under the proposed increased limits for radioactive materials in inventory.

2.3 OPPOSITION TO NUCLEAR ACTIVITIES

DOE acknowledges that many people are opposed to the development and testing of nuclear weapons. Since the 1940's, Congress has directed DOE and its predecessor agencies to develop and produce the nation's nuclear weapons, and to ensure the reliability and safety of the nuclear weapons stockpile. With the end of the Cold War, DOE has been developing strategies for appropriate adjustments to DOE site missions and activities consistent with current national security policies that reflect post-Cold War impacts, including a smaller enduring stockpile. However, even in the post-Cold War period, international dangers remain, and nuclear deterrence will continue to be a cornerstone of U.S. national security policy for the foreseeable future.

In 1992, the United States declared a moratorium on underground nuclear testing. In 1995, the President extended the moratorium and pursued a Comprehensive Test Ban Treaty (CTBT). Before the extension of the moratorium, Congress passed the *National Defense Authorization Act of 1994* (Public Law 103-160) which directs DOE to maintain a high level of confidence in the safety, reliability and performance of the nuclear weapons stockpile, and to maintain the ability to design, develop, manufacture, and test nuclear weapons.

DOE has developed a comprehensive program of stockpile stewardship and management that maintains essential capabilities for stockpile safety and reliability, while meeting other legal and policy directives. Stockpile stewardship capabilities are currently viewed by the United States as a means to further U.S. nonproliferation objectives in seeking a zero-yield CTBT. It is also reasonable to assume that U.S. confidence in its stewardship capabilities would remain as important, if not become more important, in future arms control negotiations to further reduce its stockpile.

LLNL is one of several national laboratories that support DOE's responsibilities for national security. DOE assigns mission elements to LLNL based on the facilities and expertise of the staff located there. Such assignments are made within the context of national security needs as expressed, for example, in Presidential Decision Directives; the National Defense Authorization Act for Fiscal Year 1994 (Public Law 103-160) and other congressional actions; the U.S. Department of Defense Nuclear Posture Review; treaties in force, such as the Nuclear Nonproliferation Treaty and the Strategic Arms Reduction Treaty (START I), and treaties signed but not yet entered into force, such as the START II and the CTBT.

2.4 CONCERNS WITH HEPA FILTERS

Plutonium work in Building 332 is normally done in filtered gloveboxes. If the filter on the glovebox should fail, the plutonium would be carried downstream to the confinement filters. The confinement filters are two stage filters used to prevent release of contamination to the environment. Plutonium operations at Building 332 have two stages of High Efficiency Particulate Air (HEPA) filters to prevent releases to the environment. Should airborne plutonium escape the primary containment barriers with their associated glovebox exhaust/filtration systems, the ventilation systems will carry it to exhaust plenums with two stages of confinement filters. One stage of filtration under normal conditions is adequate to prevent environmental releases. The second stage, in series with the first, provides redundancy in case the first stage leaks or fails, and also increases the total efficiency of collection for the system. *When a filter fails, it would capture less of the particles in the airstream, depending upon the size of the opening, but most of the previously filtered particles would remain with the damaged filter.* Although additional stages may be in use in some facilities elsewhere, and provide even more redundancy, they are not necessary. The confinement filters for Building 332 are of fire-resistant construction and are operable for at least 2 hours at temperatures of 120^{o}C (248^{o}F).

All HEPA filters that are relied on to provide confinement (final stages) of ventilation system transmitted contamination are monitored on a weekly basis for particle load as a function of differential pressure. If any single filtration stage is found to have a pressure drop greater than 4 inches WG (water gauge), filters are replaced as routine maintenance. The maximum acceptable differential pressure is 5 inches WG for all final stages of filtration. At the time of replacement, and on an annual basis, all final stage HEPA filters are in-place tested to confirm filtration efficiency and integrity of the installation with respect to gasket/frame seal. The acceptance criteria for the in-place test is in accordance with ERDA 76-21 (99.97% efficiency at a mean particle diameter of 0.7 micrometers).

To assure that the filters are not subjected to excessive pressure due to dust loading under routine operations, the pressure drop across the filters in Building 332 is monitored, and when it exceeds 4 inches WG, the filter is replaced as routine maintenance. The efficiency for filters in each stage is checked annually, and individual filters are replaced when they cannot meet 99.97% efficiency for particles ranging from 0.1 to 1.0 with an average particle size of 0.7 micrometers diameter. The Facility has recently decided to change the efficiency test criteria to a particle size of 0.3 micrometer diameter.

A concern was raised that HEPA filters are “translucent” to 0.1 micrometer diameter particles, implying that the particles have a very low capture efficiency and high penetration. The dissertation by Ronald C. Scripsick, published as LA-12797-&, Leaks in Nuclear Grade High Efficiency Aerosol Filters, 1994, Table IV-VI, provides the diameter of particles with the lowest capture efficiency, i.e., the ones that penetrate the most. For nine filters tested at the air speeds usually used in public protection, the particle diameter with the least efficiency ranged from 0.148 to 0.196 micrometers. For all nine filters, the collection efficiency for these particles was 99.97% or higher. This performance can be expected on all HEPA filters used by DOE, as the DOE acceptance testing standard rejects all filters with less than 99.97% efficiency at 0.3 micrometers, which is quite close to the particle size of maximum penetration.

DOE contractors are currently using the heterodisperse 0.7 micrometer average particle size aerosol (range from 0.1 to 3 micrometers) as recommended in ASME N510 to leak test their HEPA filters. The 0.3 micrometer monodisperse particle generators are too cumbersome to use in the field, as they weigh several tons.

Current laser particle counters allow in-place efficiency testing of HEPA filters to determine filter efficiency at any particle size, including 0.15 micrometer, the particle size at which HEPA filters are least efficient. Preliminary lab measurements show that the two methodologies (laser particle counter looking at 0.15 micrometer and the heterodisperse 0.7 micrometer average particle size aerosol) give essentially the same results when the leakage rate reaches 0.1%. This is the leakage rate assumed in the SAR and the 1992 EIS/EIR analyses for the final stage HEPA filters. Therefore, LLNL believes the current leakage checks are adequate to check for all particle sizes (including the 0.15 micrometer size).

DOE has promulgated HEPA filter standards: DOE-STD-3020-97, Specification for HEPA Filters Used by DOE Contractors; DOE-STD-3022-98, DOE HEPA Filter Test Program; DOE-STD-3025-99, Quality Assurance Inspection and Testing of HEPA Filters; and DOE-STD-3026-99, Filter Test Facility Quality Program. These standards are available at the internet site http://www.explorer.doe.gov:1776. These standards are being evaluated for incorporation into the LLNL “WorkSmart Standards” for possible inclusion in future contract modifications.

The burning of plutonium creates a substantial number of very small particles, 0.1 micrometer and smaller. However, only 0.01 % or less of the total mass of airborne plutonium formed by burning is less than 0.2 micrometers in diameter (K. Stewart, *The Particulate Material Formed by the Oxidation of Plutonium*, in Progress in Nuclear Energy Series IV, Vol. 5, 1963). The number of these particles is not as important as their total mass. To a first approximation, the potential health effect of a particle deposited in the lungs is proportional to the mass of the particle. Therefore, the particles that have the greatest penetration of tested HEPA filters are not those of the greatest health significance.

A concern was raised that many HEPA filters have been in place for a longer period of time than what experts say is appropriate and that their age has probably affected their ability to withstand a high pressure difference that could occur from loading by smoke or water in some accident scenarios. The laboratory has monitored and tested the filter performance and there have been no environmental releases of airborne plutonium except for the release in 1980. That release resulted from an incorrect changeout and sealing of HEPA filters, rather than from failure of the HEPA filter. Continuous monitoring of the facility, using methods sanctioned by the EPA, indicates that the HEPA filter systems have been operating so that emissions have not been occurring. Environmental monitoring data and assessments of public dose are discussed in the LLNL Site Annual Environmental Report (SAER).

With LLNL's continuing missions involving plutonium operations in Building 332, the priority of HEPA filter replacement has been raised. In October of 1998, detailed plans were completed to replace all confinement filters older than 8 years by October 1999. Meanwhile, the weekly surveillance of pressure drop and the annual leak testing of confinement filters will continue. These filters are not subjected to excessive cold or heating, and the ventilation design and fire protection system is intended to protect them during accidents involving fire. Analyses have been made of accidents of credible fire releases in the Building 332 SAR. An accident that loses the integrity of both banks of confinement filters was regarded as incredible (a probability of less than one in one million per year). The consequences of the credible accidents do not exceed radiological dose guidelines at the site boundary or the impacts of bounding accidents in the 1992 EIS/EIR. Nevertheless, DOE recognizes that accidents of low probability can occur.

DOE acknowledges that one type of filter in use is only partially qualified for nuclear applications. This filter is commonly referred to as a "box" or "birdcage" filter, and is used in some locations. The facility assures adequate performance in routine operations by weekly surveillance of the pressure drop and by annual tests of filtration efficiency. Confinement filter systems served by this type are:

- Downdraft room exhaust sub-system containing 4 filters

- Increment III glovebox exhaust containing 2 trains of 4 filters each for a total of 8 filters.

After the near-term exchange is made to attain filters that are less than 8 years old, the laboratory will consider the design changes necessary to replace the box filters.

LLNL currently has policies and procedures in place for the proper management of used HEPA filters from programmatic operations. Used HEPA filters are characterized for waste acceptance criteria either through process knowledge or sampling and analysis. Depending on the results of the characterization, HEPA filters may be disposed of as low-level radioactive waste (LLW) or low-level mixed waste (LLMW). If the quantities and types of radionuclide contamination meet the definition of transuranic waste, the filters have been stored onsite or at the Nevada Test Site until they can be disposed of at the Waste Isolation Pilot Plant (WIPP). These HEPA filters are stored in metal drums or metal boxes.

A concern was raised that DOE does not have a single, central office that oversees and provides guidance in the use of HEPA filters complex-wide. DOE is a large organization whose structure does not lend itself to a separate, central office for every aspect of environment, safety and health (ES&H). Rather, DOE relates its ES&H performance expectations to its contractors, and enforces these through contractual mechanisms, changing contractors if necessary. DOE offices in the field provide oversight of the contractor ES&H programs. The Defense Nuclear Facilities Safety Board (DNFSB) provides further oversight. DOE expectations include meeting requirements in the DOE orders and Federal regulations that provide for protection of workers and public from radiation. Violations of the Federal regulations are enforced under 10 CFR 820 by an independent office in DOE.